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Combining User-Centered and Persuasive Design for Enhancing Consumer-facing Products

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ABSTRACT OF
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<p>Persuasion is the process of changing individuals’ attitude, or behavior, or both. The study of persuasion in the context of technology has lead to building models for designing persuasive software. Following these models’ specifications has been believed to enhance system persuasive effect.</p> <p>In this research, we aim at answering the question of the suitability of persuasive system design models for different software systems. We investigate the role of user-centered design approaches, in electing concepts of persuasive system models, in order to increase persuasiveness. Moreover, we test the effect of performing usability tests on alternative onboarding scenarios, while A/B testing small changes to the existing onboarding design.</p> <p>The methodology of this research defines an artifact that we want to build. The artifact is a system that provides the feature of renting used clothes through “Le Tote”. We gather information about the users needs and the stakeholders desires of building a persuasive system, and we then use persuasive system models to fullfil these needs, and build the artifact. After that, we evaluate the artifact and the designs through usability testing of the onboarding scenarios, and A/B testing the minor changes in the existing design.</p> <p>Combining user-centered design approaches with persuasive system design models helps in electing specific persuasive concepts which are suitable for the nature of the technology. We conclude that not all concepts from persuasive models can be applied to all technologies. Moreover, using usability tests in the whole product, in addition to A/B tests on minor design changes, leads to revealing the need to focus on micro-interactions and language in persuasive scenarios.</p>			
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Chapter 1

Introduction

Studying users' attitudes and behaviors and how to change them has always been an important topic in information system research. Creating and testing attitude or behavior changing products is getting easier. As a result, more individuals and companies are building persuasive systems, which led to persuasive system design being a major contributor in the design of consumer-facing products. Persuasive systems are systems designed to either reinforce, change or shape users' attitudes, behavior or both (Oinas-Kukkonen and Harjumaa, 2009). This alteration has to be done without using coercion or deception (Oinas-Kukkonen and Harjumaa, 2008). The study of computers as persuasive systems is often referred to as captology (Fogg et al., 2002). Persuasion in computing systems can happen over two levels: macro level (referred to as macrosuasion), and micro level (referred to as microsuation) (Fogg et al., 2002). Fogg et al. (2002) suggested that computers can play a role in persuasion in three different ways: as persuasive tools to increase capabilities, as mediums which provide experiences, or as social actors to create relationships.

It is important to mention that computers do not have intentions of their own; those who create the technology are the ones who have the intention to alter behavior and attitude (Oinas-Kukkonen and Harjumaa, 2009). Consecutively, persuasion has been considered as a communication process (Harjumaa and Oinas-Kukkonen, 2007). In this process, a persuasive message is sent to the persuadee, with the intention of altering his attitude or behavior. The persuader always leaves the decision making for the persuadee. It is important to analyze the persuasion context to be able to effectively persuade. This context consists of recognizing the intent, understanding the event, and defining the strategies in use for persuasion (Oinas-Kukkonen and Harjumaa, 2008). Cialdini and Garde (1987) outline six general techniques of persuasion: reciprocation, commitment and consistency, social proof, liking,

authority and scarcity. Oinas-Kukkonen and Harjumaa (2009) categorize the principles of system persuasiveness into four categories: primary task support, dialogue support, system credibility, and social support.

For development and design of persuasive technologies, the Persuasive System Design Model (PSD) can be used (Oinas-Kukkonen and Harjumaa, 2009). User Centered Design (UCD) can be integrated with PSD for building more efficient persuasive systems. Within UCD, and during the whole design and development cycle of a technology, close cooperation is sought between creators, users and stakeholders. By involving users from an early stage, user problems can be recognized, and prevented (Jong et al., 2014). Several models of combining UCD and PSD have been proposed. Systems can be built with the persuasive system design model, and then tested through users (Jong et al., 2014). Moreover, PSD can be used to prevent user problems discovered during UCD, and to support end users during the decision making process (Beerlage-de Jong et al., n.d.). To our knowledge, a model that tests the effect of complying with the PSD using user-centered testing approaches has not been proposed before.

1.1 Objectives and Research Questions

In this research, we combine Persuasive System Design with User Centered Design to design a system that intends to change the attitude of users towards renting clothes, and introduces the idea of the “Tote”; a box that you get periodically with items tailored for you inside. We start by analyzing the current available system, then we revisit the onboarding process of the system. Finally, we redesign the onboarding process to incorporate persuasive system design principles. We then move to the user testing phase, where we test two methodologies of UCD: Onsite user testing and A/B testing. During onsite user testing, we provide each tester with one of three full onboarding design alternatives, and we analyze their responses. During A/B testing, we analyze small persuasion-oriented changes applied to steps during the onboarding process, and their effect on changing users’ attitude. Finally, we propose our findings through analyzing the objective and subjective results from both tests, and provide recommendations for involving users in testing the effect of persuasive systems.

Following the previous methodology, we aim at answering the question of applying user-centred design concepts during the persuasive design of current technologies. Persuasive design has always been thought of as a separate procedure, where designers apply persuasion concepts on the design, without involving or getting feedback from the users. In this research, we investigate

the effect of involving the users through the persuasive design life cycle, and the benefits this involvement carries. The questions we tried to answer in this research are:

- Are all concepts from different persuasive design models suitable for different types of software?
- What is the value added by using user-centered methodology for designing persuasive systems in evaluating persuasive concepts?
- What insights and observations can we get from usability testing of persuasive elements during software design?
- Can we test microsuasion and macrosuasion design changes simultaneously? And what are the benefits of it?

It is worth mentioning that this research is structured based on the Information Systems Research Framework, which is proposed in the context of design science (Von Alan et al., 2004). The purpose of the research is to widen both human and organizational capabilities by proposing novel and innovative products and artifacts.

1.2 Environment

The practical part of this study is done in the context of an internship in a subscription-based clothing rental startup located in San Francisco. The startup “Le Tote” operates in the United States market with around 35,000 paid customers. “Le Tote” offers customers different monthly subscription plans. In exchange, the user gets unlimited boxes of rented clothing items to wear for unlimited time. When the customer is done, she can return it back, and get the next box of five items. The five items the customer gets are curated by a recommender that takes into consideration the customer’s location, liked items, size, fit and inventory availability. After curating the items, the customer can swap them with other items she likes more by browsing through the available inventory. Upon confirmation, the box is shipped.

I had the chance to work as a product and growth designer within “Le Tote” office in San Francisco for seven months. During the seven months, the product team tried to deploy scientific research along with common patterns to improve growth. Growth was an important goal for the stakeholders, as the company was going through fund-raising. We performed user interviews, and user tests to redesign the whole onboarding process of the product.

During some user testing sessions, users showed a clear feeling of scepticism of renting clothes, despite the general feeling of attraction towards the

idea; as it saves both time and money for the user. This was our main motive to apply persuasion techniques, to change the attitude of users towards renting clothes, while pointing out the benefits of this model for the user.

Chapter 2

Persuasion and Technology

In this chapter, we explore the work done in the field of persuasion, and its applications in software design. We discuss the work of Fogg (Fogg et al., 2002, Fogg, 2003, 2009*a,b*), Cialdini (Cialdini and Garde, 1987), and Oinas-Kukkonen and Harjumaa (Oinas-Kukkonen and Harjumaa, 2009, 2008, Harjumaa and Oinas-Kukkonen, 2007) in detail. We then present some of the work done in evaluating the implementation of persuasive techniques in the design of various software systems. Finally, we present the concepts of ethical persuasion, and how to avoid unethical consequences of applying persuasive techniques.

2.1 Psychology of Persuasion

Persuasion, as a concept, and starting to study it dates back to the fifth century B.C.E., and to Greek thinkers and philosophers, like Aristotle, Protagoras, and Gorgias (Conley, 1990). Following this period, study of persuasion received continuing attention from researchers in various fields. O’keefe (2015) defines persuasion as the process of changing a person’s mental states. This change is usually a start for a constant behavioural change. He states that persuasion is perceived as a change in attitude, which is the person’s general evaluation of any object. This change can be in the valence (positive or negative) or in the extremity of the person’s evaluation. Other mental states that can be changed by persuasion include normative considerations and self-efficacy. O’keefe goes on to explain that attitude change is not the target change in persuasion; it is just a means to behavioural change, even though persuaders primarily seek to change the mental states.

Although research done in persuasion has been aimed at developing general concepts for persuasion that are not typically bound to any context,

any persuasion research includes a particular context. Research has been performed to study the effect of persuasive techniques in general opinion change (Hovland et al., 1953), and to study the relation between the individual differences between subjects and their suitability to be persuaded (Cacioppo et al., 1986). The Elaboration Likelihood Model (ELM) of persuasion (Petty and Cacioppo, 1986) investigates the process of attitude change, and it proposes two major routes to persuasion: the central route and the peripheral route. A study of the effect of persuasion on the healing process was performed, and it identified some biomedical reactions enforcing the ability of the mind to affect physical states (Frank and Frank, 1993). Popkin studied the effect of persuasion on changing voters decisions during campaigns and elections (Popkin, 1994). Persuasion should be ethical, otherwise, it becomes a form of coercion. Coercive persuasion attempts to force people to change their beliefs, ideas, attitudes or behaviors using emotional pressure, undue influence, threats, anxiety, intimidation and/or stress (Ofshe, 1992, Schein et al., 1961).

Cialdini and Garde (1987) suggest six main principles for persuasion, which are not bound to any context. The principles are as follows:

Reciprocation Generally, people feel indebted after someone does something for them, or even gives them a gift. This concept states that people will always want to give you something in return, provided that you give them something first. The thing you give can be information, free samples, or a positive experience.

Social Proof People tend to follow the lead of others, especially when they are uncertain about the course of action to take. When the situation is critical, however, and there is not much alternative, people usually follow anyone who seems to know what he is doing.

Commitment and Consistency People feel they must always align their actions and promises to their choices or the thing they have committed to. Moreover, people like to follow pre-existing habits, attitudes, and actions.

Liking There is a higher chance that people would say yes to people they know, or people they like. Two things that increase liking in particular are similarity and praise. People will favor someone who gives them compliments, or who is physically attractive.

Authority Authority is highly respected in society. People tend to follow real experts. If someone tells us we should act in a certain way then, if

we believe they are in position of authority, we will obey them. Even just giving the appearance of authority increases the likelihood that people will comply with the requests.

Scarcity Scarcity relates to supply and demand. When things become less available, the more valuable they become and the more desirable they are.

With these six principles, Cialdini and Garde (1987) prove that there are reliable methods that help in persuasion, and changing the attitude of the persuadee. Moreover, Cialdini and Garde (1987) propose an influence techniques approach; where he concluded that individuals respond automatically to one piece of information instead of reacting on the basis of thorough analysis of all the information presented (Cialdini, 2009).

2.2 Persuasion in Software Design

2.2.1 Computers as Persuaders

Persuasion as a psychological concept had to essentially have an impact on software systems design. Software makers aims at convincing users that their product is likeable, and to persuade them to use it. Research in persuasive system design worked towards establishing a concrete model for applying persuasive concepts in the software design process. Fogg discussed the role of computers as persuasive social actors (Fogg, 2003). He argued that, at times, people do respond to computer as if they were real living beings. This led to computers having a bigger role in persuasion; as computers have the ability to apply persuasion dynamics through social influence. Fogg (2003) proposes five primary types of social cues that lead people to infer social presence in any computer product:

Physical The use of software that have a physical interface which can be manipulated, or have a human-like shape (in the form of a talking face or a robot) can create huge opportunities to persuade. Moreover, the more attractive the technology (interface or hardware) is, the greater persuasive power it has over users. Other researchers confirmed that and stated that only the appearance of a computer character is enough to change its social influence (Parise et al., 1999).

Psychological The users of a software product can infer that it has emotions through some psychological cues. This cues can be icons onscreen that

portray emotions, or messages that convey empathy. The cues might be more complex, such as cues that convey personality.

Language The use of interactive language, dialogues and spoken language conveys social presence and makes it easier to persuade users. Adding language or voice recognition to a system also has a positive impact on persuasion. When a system uses a language that offers praise, it leads people to be more open to persuasion, therefore affecting people's attitudes and behaviors.

Social Dynamics Social dynamics are the unwritten rules for interacting with others. Computers can apply social dynamics, such as cooperation, praise, turn taking, reciprocity, to convey social presence, and eventually persuade.

Social Roles Computers adopting a human role can have impressive impact on persuading users. Computers assuming roles of authority, will have enhanced power of persuasion.

Fogg presents a behavior model for persuasive design (Fogg, 2009a). The model has three factors: motivation, ability, and triggers. As motivation and ability increases, the individual likeliness to perform target behavior increases. Core motivators consist of pleasure/pain, hope/fear, and social acceptance/rejection. The ability to perform a behavior is essentially linked to its simplicity. Fogg suggests six simplicity factors: time, money, physical effort, brain cycles, social deviance, and non-routine. As those factors decrease, the individual is more likely to be persuaded. Lastly, Fogg stated three types of triggers: spark as trigger, facilitator as trigger, and signal as trigger. The facilitator trigger is for users with high motivation and low ability, we refer to use this trigger later in our research.

Fogg proposes a framework for persuasive technology (Fogg et al., 2002). Fogg discusses the design of computers as persuasive technologies, referred to as captology. He defines persuasion as a non-coercive attempt to change attitude or behavior. Fogg presents three roles for computers in persuasion context: as tools, as media, and as social actors. He proposes two levels of analysis for persuasion and interactive technologies:

Macrosuasion The macro level of persuasion is when a product is designed as a whole for persuasive outcome. This implies that motivation and persuasion are the only reason these products exist. An example of macrosuasion is a product targeting teenagers with an overall purpose of persuading them to avoid becoming parents early. Another example

is products aiming at changing behaviors of smokers, and altering their attitude towards so that they quit.

Microsuasion On the other hand, microsuasion refers to products that does not necessarily have an overall aim of persuasion, but they incorporate smaller elements of persuasion through the experience to achieve other goals, and to persuade. It is worth mentioning that most software products were not built with persuasion as the main target. Elements of persuasion include guidance, drawing attention, timing of presenting information (opportune moment), and error proofing.

2.2.2 Persuasive System Design Model

Part of the prominent work done in persuasion in software was presented by Harjuma and Oinas-Kukkonen. Harjumaa and Oinas-Kukkonen (2007) define persuasion to be a part of influence, along with inducements and coercion. The paper presented three types of persuasion: interpersonal persuasion, computer-mediated persuasion, and human-computer persuasion. Persuasion technology is positioned in the last type, which is the study of how people are persuaded by computers through mere interaction (Fogg, 2002). Oinas-Kukkonen and Harjumaa (2008) further investigate the role of persuasion in software and information systems. In this paper, persuasive systems are defined as any information system designed to reinforce, change, or shape attitudes, and behaviors without using coercion or deception. Although being persuaded means that individuals are supposed to abandon one set of behaviors and to adopt another (Miller, 1980), shaping behavior have a higher success chance than behavior change. Any persuasive technology has five components: persuader, persuadee, message, channel, and context (Oinas-Kukkonen and Harjumaa, 2008). There are two strategies for persuasion: a direct and an indirect route (Oinas-Kukkonen and Harjumaa, 2008, Hovland et al., 1953). Both strategies can act simultaneously to persuade.

Oinas-Kukkonen and Harjumaa (2009) present a persuasive system design model, its key features, and its issues. The development of any persuasive system involves three main steps: understanding key issues behind persuasive systems, analyzing the persuasion context, and design of system qualities. The research defines seven postulates that need to be addressed on designing or evaluating a persuasive system, as part of understanding the issues behind it. Moving to the analysis step, the system designer has to define the intent, the event, and the strategy, taking into consideration that the user (persuadee) is a human information processor (McGuire, 1973). For defining the intent, it is an essential step to define the persuader; as computers do not

have intentions of their own. there are three different sources of intentions: endogenous, exogenous, and autogenous (Fogg, 1998). To analyze the persuasion event, it is important that the user goals become clear. This helps in considering the features arising from the problem domain which the software is solving. Moreover, persuasive systems should encourage users to set goals themselves, and to discover ways to achieve them. Persuasion relies on techniques and strategies that triggers emotions in the persuadee. Defining a proper persuasion strategy route is a central question in persuasion design. This can happen through a direct or an indirect route. For the last step of designing system qualities, Oinas-Kukkonen and Harjumaa (2009) propose four main principles:

Primary Task Support This principle suggest providing support for user in carrying out his primary task. The main principles derived from primary task support are reduction, tunneling, tailoring, personalization, self-monitoring, simulation, and rehearsal.

Dialogue Support Interactive systems should provide a feedback response system using dialogue-like conversations, that helps users moving on towards their goal or targeted behavior. The main principles derived from dialogue support are praise, rewards, reminders, suggestions, similarity, liking, and social role.

System Credibility Support A system designer should design a system that is more credible to the users, thus more persuasive. The main principles of system credibility are trustworthiness, expertise, surface credibility, real-world feel, authority, third-party endorsement, verifiability.

Social Support Social support leverages social influence to motivate the users. This concept consists of social learning, social comparison, normative influence, social facilitation, cooperation, competition, and recognition.

2.3 Persuasive Design Applications

Following the efforts in building models for persuasive system design, many researchers studied these concepts, and started building actual systems that applies the concepts. Researchers then evaluated the effect of using the principles of persuasion. In this section, we present some of the work in this area.

Beerlage-de Jong et al. (n.d.) propose a framework for developing e-health technologies. The framework combines user-centered design, and persuasive system design concepts, to build products that aim at persuasion. The paper concluded that using both design techniques together allow them to complement each other, and enriches the process of persuasion. The framework process consisted of five steps in an iterative style: contextual inquiry, value specification, system design, operationalization, and evaluation. De Jong et al. (2014) build on top of the previous framework, and actually applies user-centered design concepts through assessment, and user evaluation on an e-health web-based system. Harjumaa (n.d.) proposes a framework for designing and evaluating systems aiming at behaviour change support. Gretzel and Fesenmaier (2006) investigate the role of persuasion in recommender systems, and the factors influencing the perception of the user of the fitness of the recommended output to what they expected. Kaptein and van Halteren (2013) and Kaptein et al. (2012) evaluate the effect of using persuasive messaging that adapts to the users profiles on retention. The evaluation includes both persuasive email reminders, and tailored persuasive text messages. A study on conversion rates evaluated the effect of using persuasive Natural Language Processing (NLP) on Google AdWords (Guerini et al., 2010). An evaluation of perceived persuasiveness performed using a questionnaire through user tests and expert analysis concluded that expert users of a system can detect the presence of persuasive system design constructs in the system (Jong et al., 2014).

The previous studies confirm that applications of persuasive system design vary widely across different fields, and that persuasion concepts have proven valuable through researchers and experts evaluation of persuasive system design application.

2.4 Ethical Persuasion

Persuasive technology can raise a number of ethical concerns, since it combines two controversial domains: persuasion and technology. The questions of whether persuasion is ethical or not, and in case it can be either, what is the borderline of it being unethical, has been studied by many researchers. Verbeek (2006) proposes an expanded framework for evaluating the ethics of persuasive technologies. Fogg (2002) argues that the ethical issues relating to persuasive technologies are similar to those for persuasion in general. Fogg lists six main concerns while designing persuasive systems:

- The novelty of the technology can distract the user and drive him into persuasion, which raises ethical questions.

- People can accept information given to them by a computer, as persuasive technology can exploit the positive perception of computers as being smart.
- Computer can be pro-actively persistent, in the form of reminders, or cues.
- Computers essentially control the interaction process during persuasion. Unlike human interaction during persuasion, which you can stop at any time and ask for clarification, humans can not control the computer persuasion process.
- The way computers interact with human give them the advantage of being able to affect emotions, but not to get affected.
- Computers usually can not take responsibility for errors that occur due to their acts of trying to persuade the user.

Fogg states that if an unethical outcome occurs from a persuasion process - intentionally or unintentionally - the system designer is always responsible and at fault.

Berdichevsky and Neuenschwander (1999) propose three principles for achieving an ethical persuasive system:

Dual Privacy Principle Creators of persuasive systems should ensure that their system values the privacy of the information of the users, as much as they would want it to value the privacy of their own information.

Disclosure Principle Creators of persuasive systems should disclose the intentions, motives, and expected outcomes of their system, unless this would lead to an unethical outcome.

Accuracy Principle The persuasive technology must sustain accuracy and never misinform users in order to achieve the desired persuasive outcome.

There has been a considerable amount of research aiming at defining the fine line between ethical and unethical forms of persuasion. Models for ethical persuasive technology design have been proposed, but have not been fully evaluated yet. The question of a technology being ethical or not remains relatively difficult to answer.

Chapter 3

Methods

In this chapter, we discuss the usage of the concepts and theories introduced in chapter chapter 2, and the way it can be integrated in building a system or a product. We divide our methodology into two parts: the development and design cycle and the evaluation cycle through usability testing. This division follows the work done before in combining user-centred design with persuasion concepts (Niebuhr and Kerkow, 2007, De Jong et al., 2014).

Any persuasive system development cycle consists of three main steps, as defined by Oinas-Kukkonen and Harjumaa (2009). The first step is analyzing the persuasion context, and selecting the appropriate persuasion design principles for it. The second step involves defining the requirement of the software qualities of the system, this can include responsiveness, positive user experience, and ease of use. The last step is actually implementing the system or the product. The development cycle is typically followed by the attitude or behavior change. In our case, we replaced it with the evaluation step.

Along with the three steps mentioned before, we integrated the eight-step design process of creating persuasive technologies (Fogg, 2009*b*). This gave us a complete process for designing and evaluating persuasive systems (Figure 3.1).

The methodology follows the Information Systems Research Framework, which is proposed by Von Alan et al. (2004). We define the environment and the business needs for the stakeholders, and use the applicable knowledge of persuasive theories in psychology and technology, to develop an artifact that includes both. We then assess the artifact (the software system) through experiments and usability studies, and refine it, until we reach the desired output, or the required level of persuasion.

3.1 System Design

Following the behavioral model for persuasive design (Fogg, 2009a), we focused on the ability factor and the trigger factor of the model during the whole design and evaluation process. For the ability factor, we tried to minimize the time needed to start performing the action and to change the attitude. We also focused on showing that the software would minimize the physical effort needed for shopping for rented clothes, which increases the user ability as well. For the trigger factor, we presented our product as a facilitator. The user motivation from renting clothes would be saving money, however, they might have low ability of going to second hand shops to buy clothes, due to lack of time or any other reason. We focused on increasing their ability by presenting the software, thus making the behavior or attitude change easier to achieve.

As Fogg et al. (2002) suggest, there are two levels on which persuasion can happen; micro-level, also known as microsuasion, and macro-level, also known as macrosuasion. We present our approach in integrating user-centered design in both levels in the following sections.

3.1.1 Designing for Macrosuasion

Macrosuasion is used to describe the level of persuasion in which a whole product is trying to change the attitude or the behaviour of a user (Fogg et al., 2002). One of the most important steps, when designing a product with macrosuasion in mind, is the first point of interaction of the users with the product, or what is formally known as onboarding. Onboarding is becoming more critical for any product to succeed in delivering the persuasive goal to the user at an early stage. We decided to test different onboarding scenarios, each involves providing the user with explicit and implicit cues on the persuasive goal of a product. We realized that defining a set of goals leading to performing the primary task of the onboarding process can have a strong impact on the way the onboarding process is shaped. In our research, we defined this set of goals as specific as possible; in order to provide primary task support (Oinas-Kukkonen and Harjumaa, 2009) for users engaging with the system. The set of goals of the onboarding process consisted of:

Understanding At a basic level, the user gets what the system functionality is, and what it offers.

Advocacy Beyond understanding the system, the user is able to articulate key value propositions and added values of using the system.

Education The user starts to learn how to master key system functionalities through practicing them during onboarding.

Conversion The user actually completes the onboarding and turns into a signed-up user.

After defining the set of goals that the user should achieve during the onboarding process, we started building the persuasive onboarding scenarios to test, with the main goal of clarifying the intent of changing attitude towards renting. Setting of the primary tasks and the goals made it clear how we can apply the persuasive system techniques on the onboarding scenarios. We decided to test various persuasive techniques in three main onboarding scenarios, including the original existing flow. As a basic rule, we agreed to offer primary task support for all the test scenarios, as defined by Oinas-Kukkonen and Harjumaa (2009). The main focus was on providing both reduction and tunneling elements of the primary task support concept. Reduction would simplify the steps for the user, and tunneling would provide more opportunities along the scenario for persuasion. We reduced the tasks required to reach each of the four goals of the onboarding process into a simple set of steps. The flows would start by an educational step to reach understanding and advocacy goals, and then it moves to some steps to enforce the value proposition of the software, and to work towards the education of the key functionalities of it. Finally, the last step works as a conclusion, and tries to capture the effect of the reach of the persuasive goal to the users by asking them to register. Tunneling was done along the steps by providing users with actions along the scenario to bring them closer to the intended attitude. This was done by offering them to test some of the main features, and use it in the flow.

Three flows were designed as follows:

1. A normal approach which uses tunneling and reduction was used for the basic flow. In addition to that, the flow used the tailoring principle through providing suggested items after getting to know the user. This provided implementation of basic persuasive concepts through the process.
2. The second flow focused on the dialogue support principle (Oinas-Kukkonen and Harjumaa, 2009). A virtual persona would guide the user through the flow by initiating a dialogue and suggesting some answers (Fogg et al., 2002). Using this approach provides an opportunity to praise the user and offer suggestions on a conversational way; both being concepts of dialogue support. The flow also utilized the usage of the tailoring and

personalization concepts, through personalizing suggestions based on the user responses to the persona.

3. The third flow leveraged the concept of reduction, by reducing all steps to one simple main task of the onboarding flow, which is giving the user the experience to actually use the software and test its functionalities. The main task is the ability to choose a set of used clothing items for renting through a swapping process. Although this task is present in the other two flows, it is the main focus of this flow, to the extent that, beside some education, it is almost the only step included in the flow. This gave the users the feeling they are in control of customizing the whole experience and items, which is similar to shopping in stores. Moreover, the flow pushes the users to align with their own decisions, as defined by the consistency and commitment concept of persuasion (Cialdini and Garde, 1987). The users get a chance to customize and choose their own items, and then they are taken directly to the sign-up page. At this point, the users have already felt committed to the service, and they want to be consistent with the earlier effort and choices they made, which would persuade them to sign-up.

The three different designs were then tested, we describe the testing methodology in detail in the following sections.

3.1.2 Designing for Microsuasion

Software systems can persuade users on the micro-level, or what is known as Microsuasion (Fogg et al., 2002). Microsuasion elements, which can be designed into dialogue boxes, icons, or interaction patterns, are meant to persuade in this level. Design patterns for microsuasion include ongoing education, good defaults, reduction, social proof, timing, and visual design. Other patterns include the concept of scarcity (Cialdini and Garde, 1987); which shows the users that opportunities are more valuable when they have limited time or quantity availability.

Using the previous concepts, we started designing small changes to the current system onboarding flow, in parallel to the macrosuasion design process. Controlled experiments were then deployed to an A/B testing platform. The tests were designed and deployed following the guide for controlled experiments on the web (Kohavi et al., 2009). We monitored and evaluated the results from the A/B tests. We present the design details and the evaluation details of the A/B tests in the following chapters.

3.2 System Usability Testing

After the new designs for both macrosuasion and microsuasion are proposed, the usability testing step is performed. The design of the usability testing experiment follows the common usability testing guidelines (Hackos et al., 1995, Dumas and Redish, 1999). We mainly followed guidelines of comparison tests (Dumas and Redish, 1999). In both levels of macrosuasion and microsuasion, we have a control design, and an experimental design, and we intend to evaluate and compare them. We describe the methodology of usability testing for each persuasion level in the following sections.

3.2.1 Usability Testing for Macrosuasion

Our goal for macrosuasion usability testing was to compare a control design to two different experimental designs, and derive results from the analysis of the walk-through of the users. We decided to perform on-site user testing sessions, during which we observe the users, record them, and record their interactions with the software. Our process was divided into three main stages as follows:

Recruiting In this stage, we designed a survey to recruit testers for the onboarding flow. Our main goal from this survey was to filter out any user who was familiar with any software that provides the same service and aims at attitude change towards clothing rental, including the original software. We provide details on the survey and the participants in chapter 5.

Testing We invited the selected users to perform the user tests at the office of “Le Tote”. The comparison test was conducted as a tightly controlled experiment, where each tester was randomly assigned one of the control and the experimental scenarios (Dumas and Redish, 1999). The alternative experimental scenarios had the same functionalities, but varied wildly in two dimensions, which are the navigation scheme, and the visual design. This helped us to test designs that have different conceptual models for the users, instead of the same one. We encouraged the testers to think aloud, and walk us through what they understand and feel from each screen design or step. We recorded the testers, the interaction with the prototype, and we analyzed the recordings after for the qualitative analysis.

Evaluation For this stage, we used an qualitative evaluation method derived from Battleson et al. (2001). We defined a set of questions before con-

ducting the experiments, and we asked the testers these questions after going through the flows. Moreover, we conducted an analysis based on the recordings, the interactions, and the users thoughts that they shared with us. We performed selective coding (Strauss and Corbin, 1998) on the scripts from the testers' recordings. We present our findings in chapter 5.

3.2.2 Usability Testing for Microsuasion through A/B testing

On proposing minor changes in the design for enforcing microsuasion, a controlled experiment can be run in order to establish causal relationship between the changes and any change in user behavior that might happen. A/B testing is a widely used form of controlled experiment. We followed the guidelines for designing controlled A/B tests (Machmouchi and Buscher, 2016, Siroker and Koomen, 2013). For each test, we had a control design, and a variant design. To ensure causality, any other change (except for the variant) was eliminated. The assignment of users to one of the variants has to be random. Half the users were assigned to the control design, and the other half were assigned the variant design. We ran the tests for 60 days each. We performed a statistical test on the results of running the A/B test. We considered the variant design better if the test rejected the null hypothesis of the overall evaluation criterion being not different in both control and variant designs (Kohavi et al., 2009).

The methodology for macrosuasion is presented in Figure 3.1, while the methodology for microsuasion is presented in Figure 3.2.

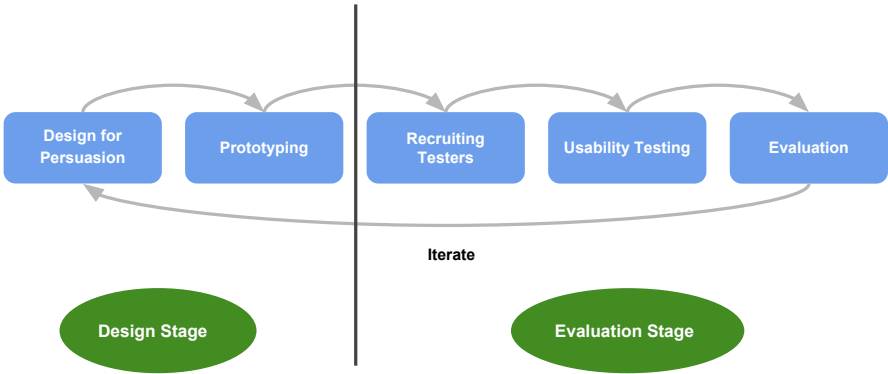


Figure 3.1: Macrosuasion Design and Evaluation Methodology, adopted from Fogg (2009*b*)

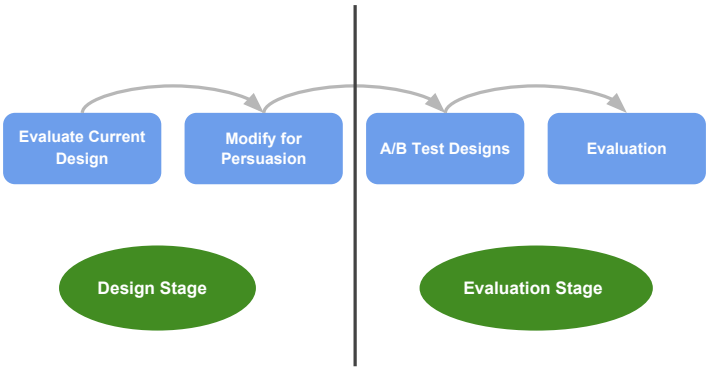


Figure 3.2: Microsuasion Design and Evaluation Methodology

Chapter 4

Implementation

In this chapter, we present our implementation of the system design, both for the macrosuasion level and the microsuasion level. We walk through the three flows for onboarding, and the logic behind redesigning them. We show that each design follows one or more concepts of persuasive system design, and we specify the different elements in the designs. We then present the small changes in design applied to the original flow to test the microsuasion level. We connect each change in design with a persuasion concept.

The designs for onboarding and for A/B tests were realized using Sketch application¹. The interactive prototypes for onboarding were implemented using Principle² and Flinto³ apps.

4.1 Onboarding Flows Design

We designed three alternative onboarding flows for the “Le Tote” mobile application. The main goals of the flows were to educate the user about the concept of clothing rentals, how the application works, and how to use the application features. The main evaluation criterion was that the user registers for the system. The three onboarding flows represented three big ideas, where each flow used different persuasion techniques.

4.1.1 First Onboarding Flow

The first flow is the control design. It used basic persuasion techniques, such as tunneling and reduction, along the flow. The basic flow starts off

¹<https://www.sketchapp.com/>

²<http://principleformac.com/>

³<https://www.flinto.com/>

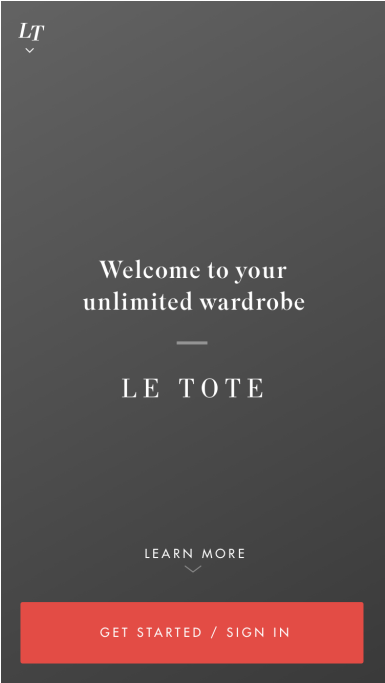
with a depersonalized homepage and an educational page on how the system works. It introduces the users to the clothing rental concept, and the “Tote” concept. The flow then asks a series of style and fit questions, to personalize the experience for the users. In the following step, we show the user a series of clothing items, which she can like or dislike. The application then takes the user to the swap page, where the user is presented with some clothing items based on the likes and dislikes from previous steps. The user can discard or swap some of the items with items in the inventory. This process follows the personalization and tailoring concepts of the primary task support element of the persuasive system design model (Oinas-Kukkonen and Harjumaa, 2009). After finalizing the contents of the “Tote”, the user is presented with the registration and payment information screen. The flow design is presented in Figure 4.1.

4.1.2 Second Onboarding Flow

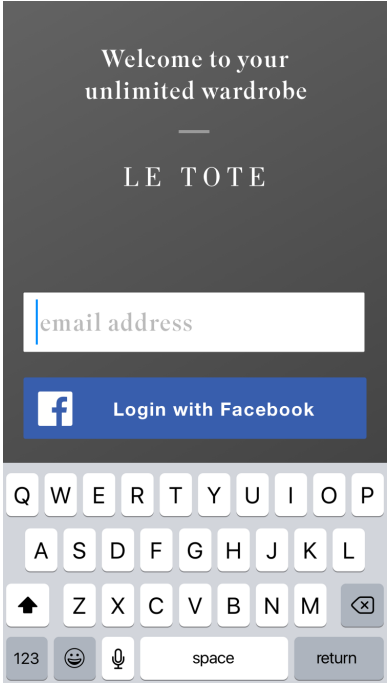
The second flow mainly focuses on the dialogue support principle of the persuasive system design model (Oinas-Kukkonen and Harjumaa, 2009). A virtual persona called “Chloe” is presented in the beginning of the flow, and she guides the user through the rest of the flow. A dialogue-like interaction style is adopted in this flow, which gives multiple opportunities of testing persuasive techniques. For instance, after Chloe suggests some items to the user, the user can then like or dislike them. At this point, Chloe can send praising notes for the choices that the user made. Praising and suggestions are core principles of dialogue support. Moreover, by presenting graphical body shapes for the user to choose from, the flow implements the concept of similarity, where a system matches the user physical shape. The flow design is presented in Figure 4.2.

4.1.3 Third Onboarding Flow

The third flow reduces the whole onboarding process into one step. Right after the user is presented with an introduction to the service and the way it works, she is taken directly to a page where 5 items are suggested for her, and default sizes are applied. The user then can swap the items she does not like, and changes the sizes to match her size. To swap an item, the user clicks on the original item she wants to swap. The system shows another screen where available items are presented. The user can tap on the item desired in order to swap it in her rented items. This process utilizes the consistency and commitment principle (Cialdini and Garde, 1987). When the users choose and swap the items and directly add their sizes, it makes



(a) Service introduction



(b) Acquiring email



(c) Suggested items



(d) Suggested accessories

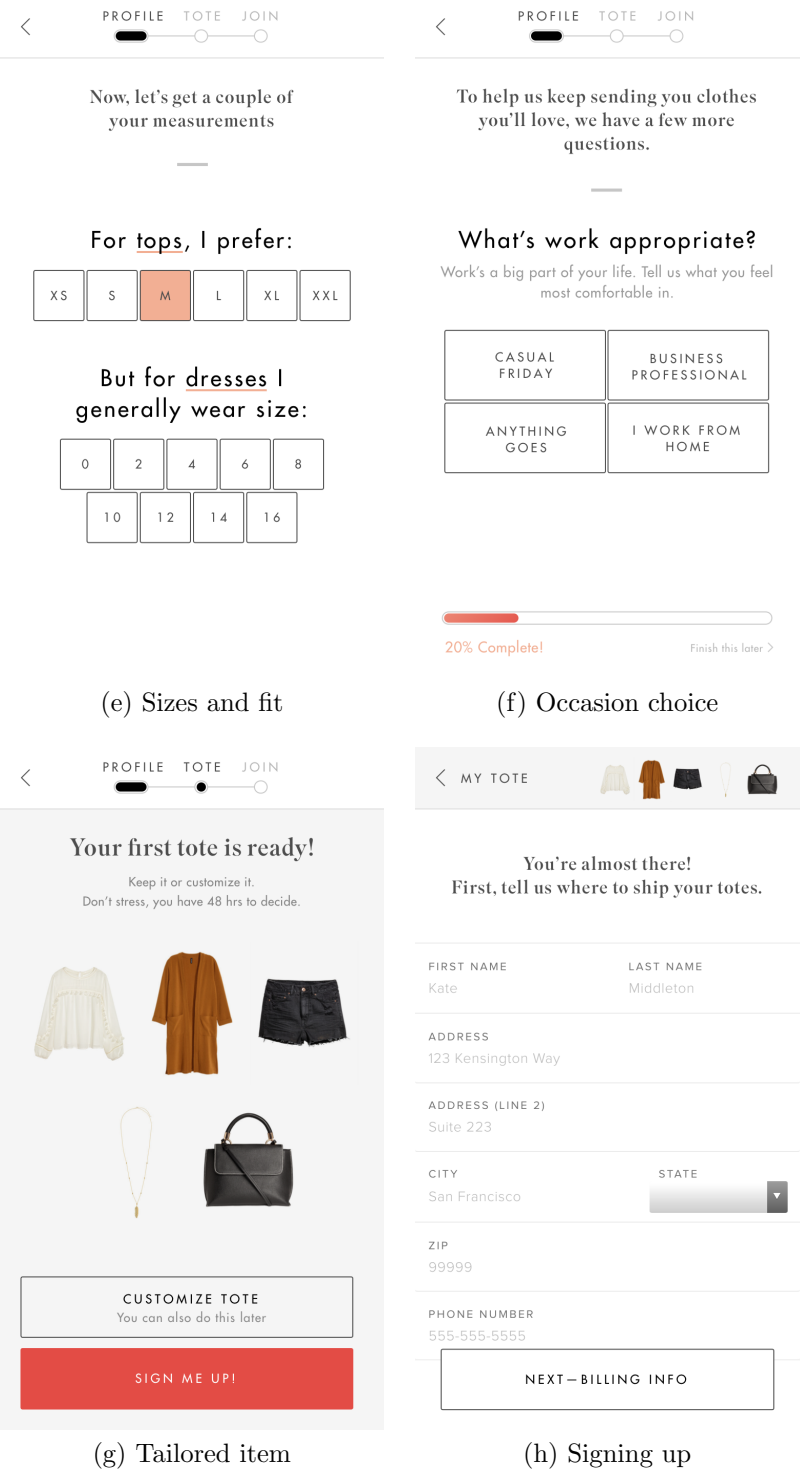


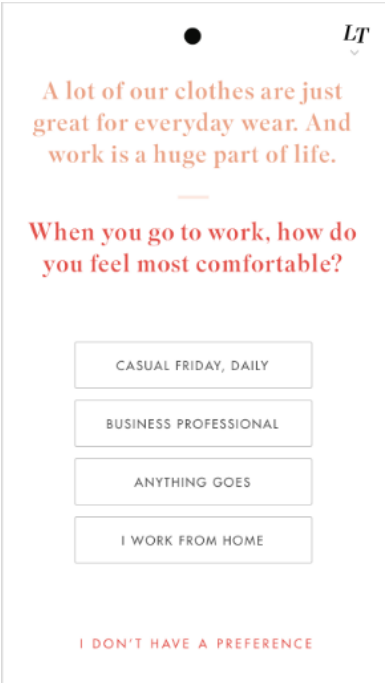
Figure 4.1: First Onboarding Flow



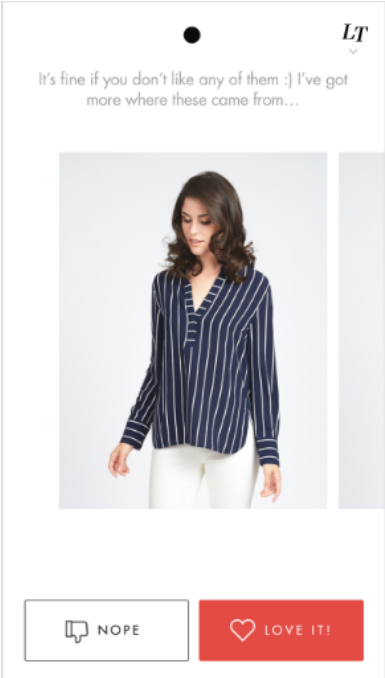
(a) Presenting Chloe



(b) Service introduction



(c) Occasion choice



(d) Suggested items

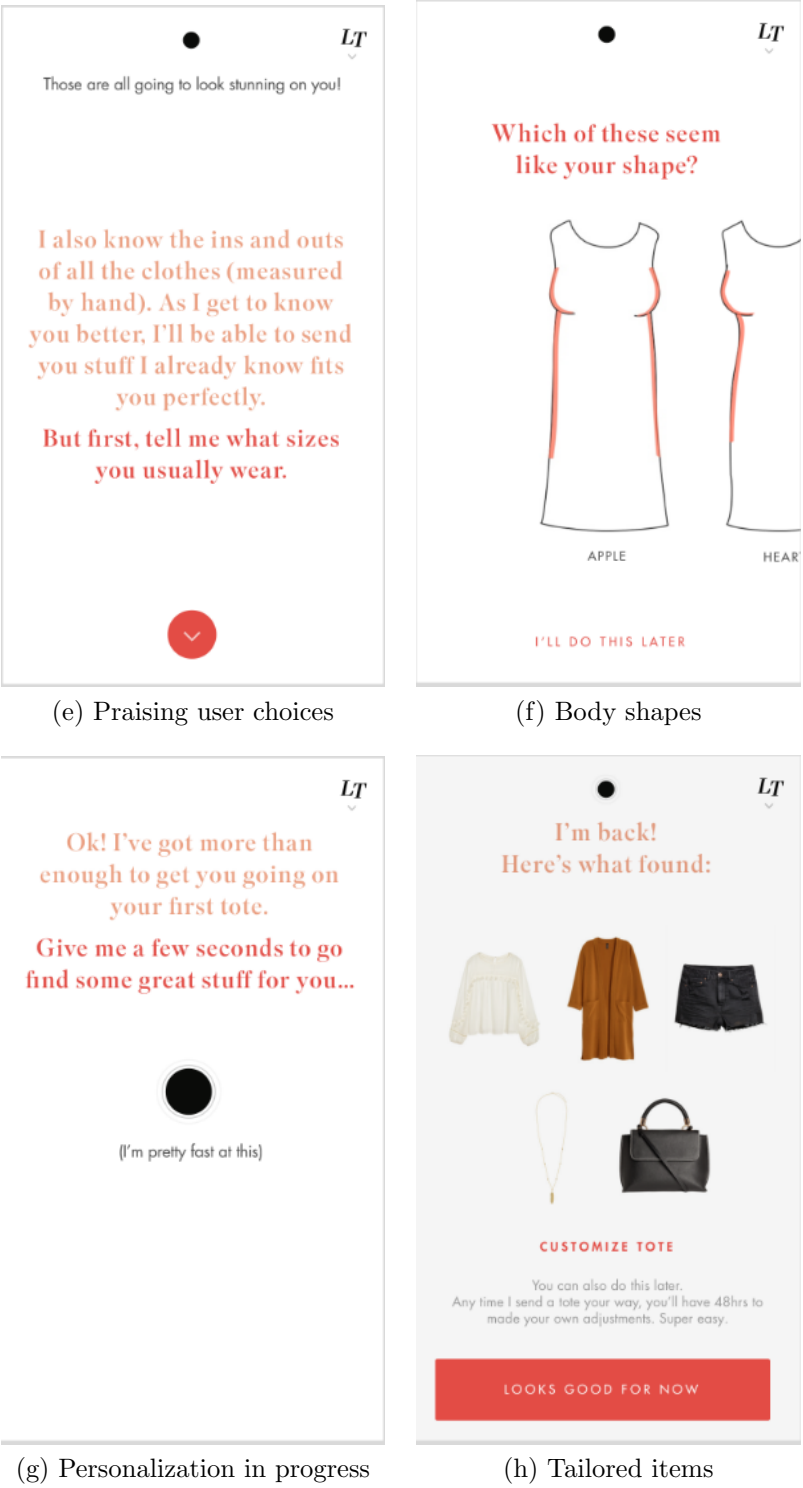


Figure 4.2: Second Onboarding Flow

them feel committed to the system and to the rental process. On moving on from this step, the users feel the need to be consistent with their commitment and should tend to finish the process to justify their previous actions. The flow design is presented in Figure 4.3.

4.2 A/B Tests Design

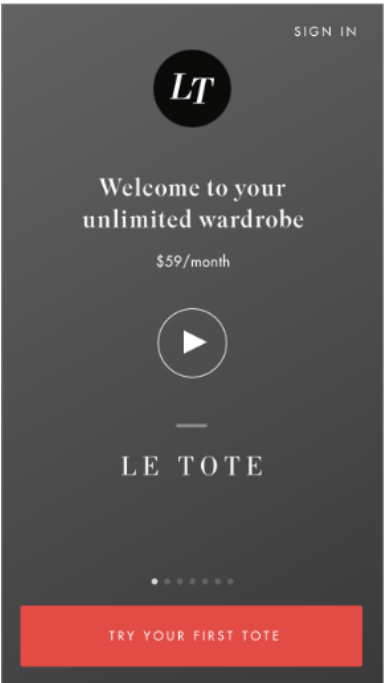
In this section, we present the designs of each of the four a/b tests we ran, and the persuasive concepts behind these designs.

Removing exit links On this test, exit links were removed from the top navigation bar of all the pages during onboarding and signing up. This implemented the principle of tunneling for primary task support; as it removes any distractions for the user and focuses her on finishing the primary task (Figure 4.4).

Dividing checkout to two pages For this design, instead of the long single checkout page, we divided the step into two pages. The first page focuses on getting your personal information, while the second page focuses on getting payment information. This implementation is supported by the reduction concept, in which we divide the checkout process into two reduced steps, and we tunnel the user through them (Figure 4.5).

Minimizing fit and size questions For the third test, we reduced the questions for fit and size to only the questions that are necessary to the recommender system to provide items to the user, and moving the rest of the questions to a later stage. This implemented the concept of reduction, and made the process of the primary task much simpler (Figure 4.6).

Adding location and occasion inputs For the last design, we wanted to test the concepts of tailoring and personalization through requesting the zip code and the occasion preference for the user. The recommender system would then provide items that match both the weather and the preferred occasions. We tested the concept of commitment as well; since the user provides her zip code and location, and she wants to be consistent with it (Figure 4.7).



(a) Service introduction



(b) Service introduction



(c) Service introduction



(d) Personalization in progress

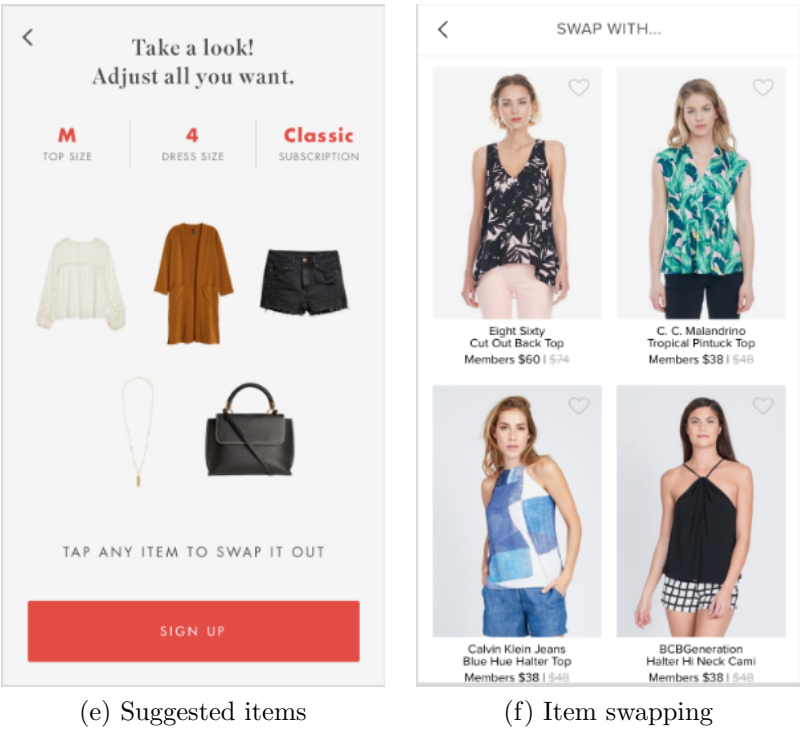


Figure 4.3: Third Onboarding Flow

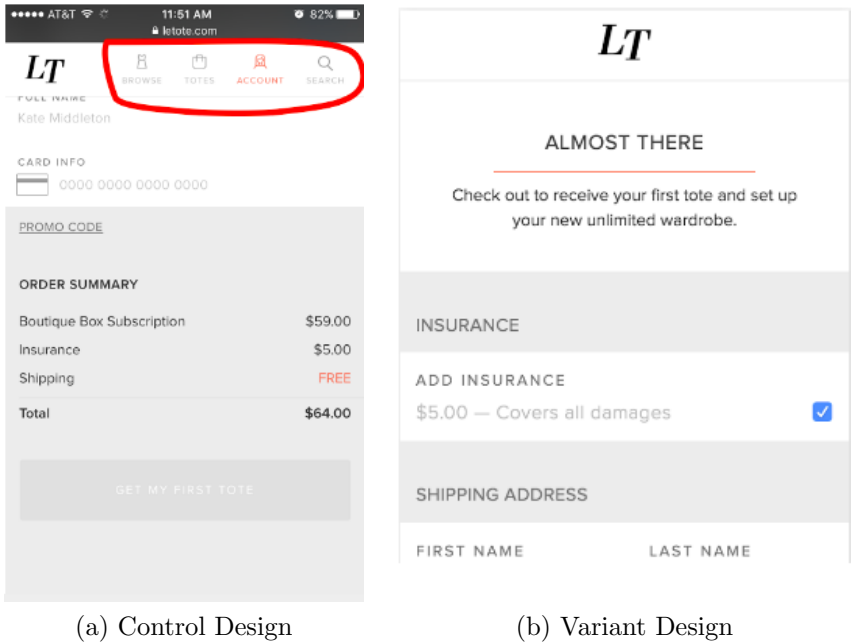


Figure 4.4: First A/B Test: removing exit links

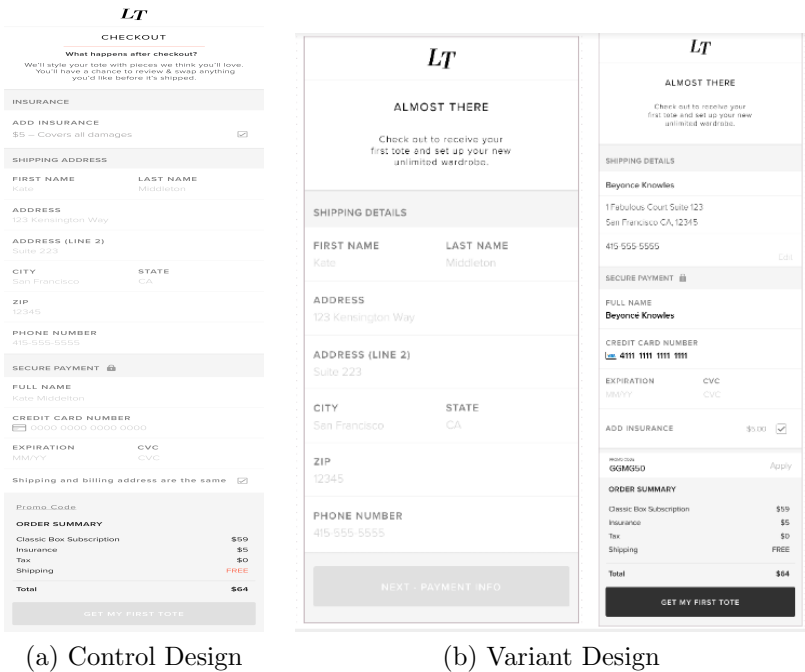


Figure 4.5: Second A/B Test: dividing checkout to two pages

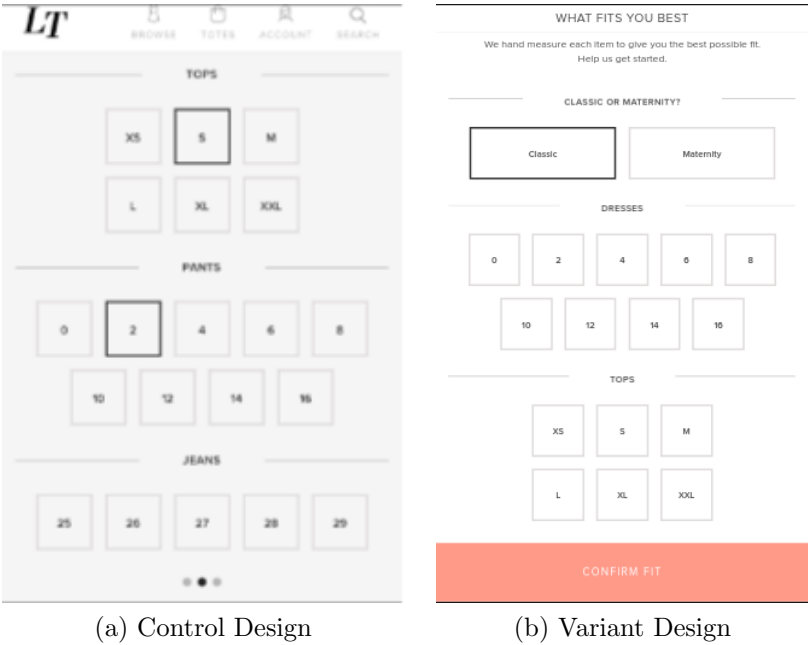


Figure 4.6: Third A/B Test: minimizing fit questions

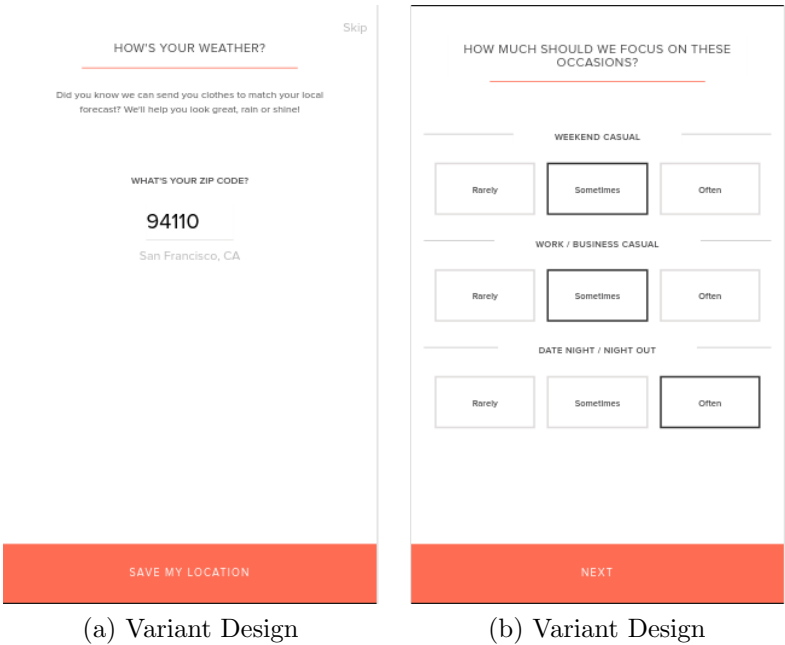


Figure 4.7: Fourth A/B Test: adding location and occasion inputs

Chapter 5

Evaluation

In this chapter, we evaluate the designs presented in chapter 4. We start by detailing the two sets of experiments for both macrosuasion and microsuasion evaluation. The experiments for macrosuasion were performed as on-site usability tests, while the experiments for microsuasion were in the form of A/B tests. We then present the methodology for evaluating the user tests for both levels.

5.1 Usability Tests for Macrosuasion

For the onboarding flows, we decided to invite testers for on-site sessions of using the flows and thinking aloud. We designed a survey to recruit participants, and each tester was given a free Amazon gift card after the test was done. The main goal of the survey was to recruit participants who had little or no experience of clothing rental software beforehand.

5.1.1 Recruiting Testers

The survey was written using Google forms, as it provided insights from the responses. The first section of the survey consisted of basic questions about the candidate (name, e-mail, age group, and gender). First section results can be seen in Figure 5.1. Second set of questions was to position the candidate in a specific income group, and to check past participation in user testing sessions (Figure 5.2). The third part of the survey investigated the candidate's familiarity with technology in general. Overview of this section results can be found in Figure 5.3 and Figure 5.4. The last part aimed at checking the familiarity of users with clothing rental services (Figure 5.5 and Figure 5.6). A full script of the questionnaire is provided in Appendix A.

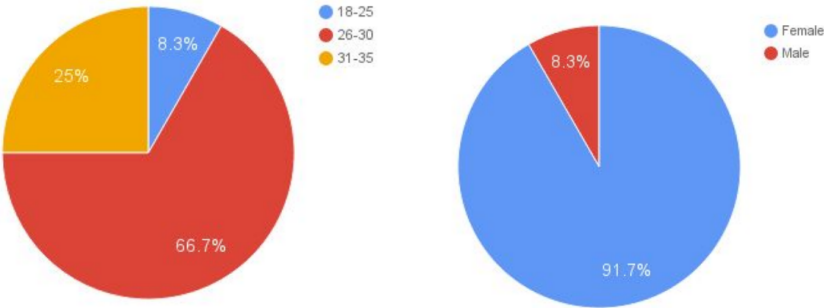


Figure 5.1: (a) Age and (b) gender of participants

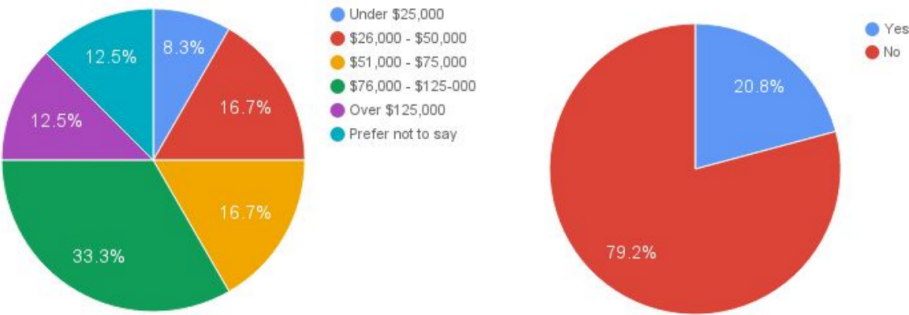


Figure 5.2: (a) Income group of participants and (b) history of participation in usability studies

We analyzed the results of the survey. Most of the interested candidates were females (92%) and were between 26 and 30 (67%). The candidates were distributed over the income groups, and most of them had not participated in usability studies before (79%). Majority of the candidates either worked in technology, or did not work in either technology or e-commerce. More than half the candidates had never used Le Tote or any similar service before the survey.

Based on this analysis, we invited sixteen participants to the office for the testing session. The sixteen participants were from mixed income groups, and mixed technology backgrounds. Their ages ranged from nineteen to thirty eight. None of the participants has used a clothing rental service before. Half of the participants were local to the San Francisco Bay Area, and the other

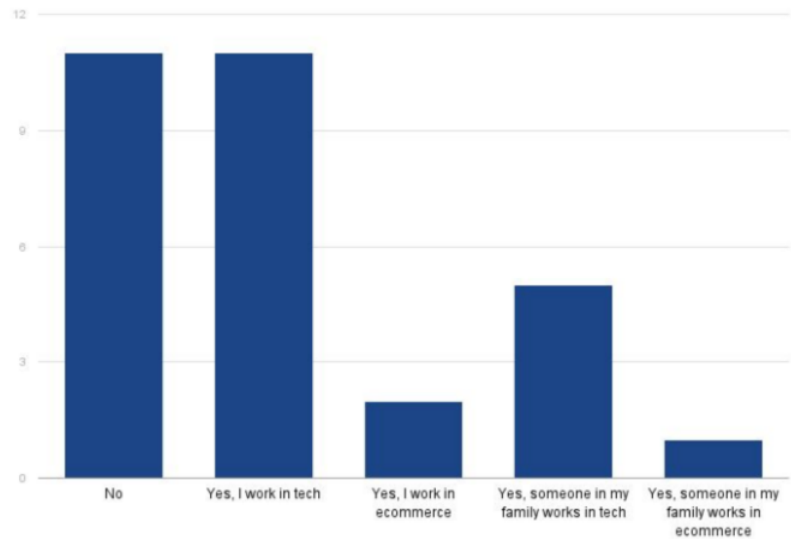


Figure 5.3: Participants working in technology field

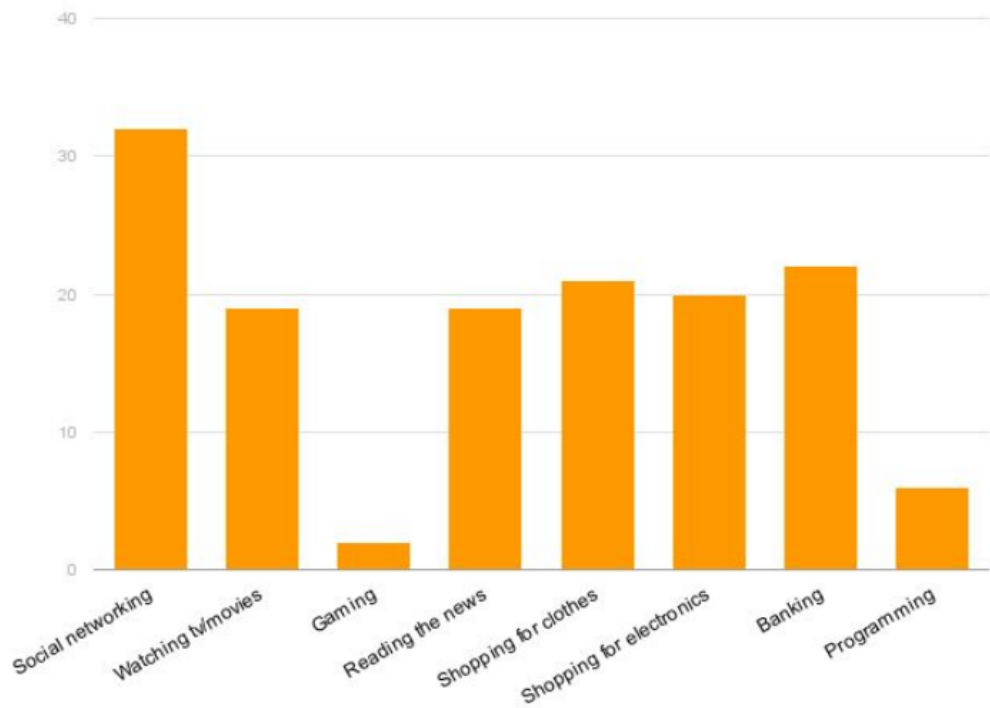


Figure 5.4: Participants usage of technology on a typical day

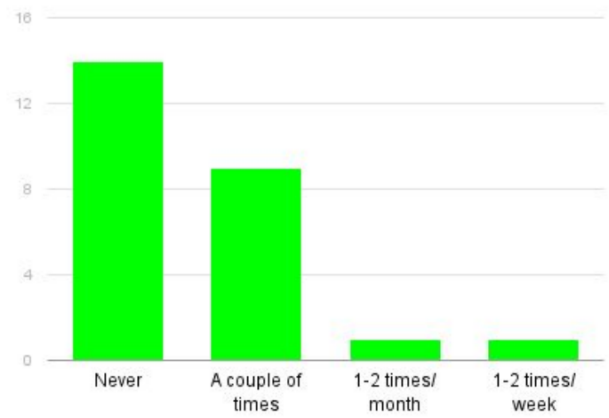


Figure 5.5: Participants usage of Le Tote before

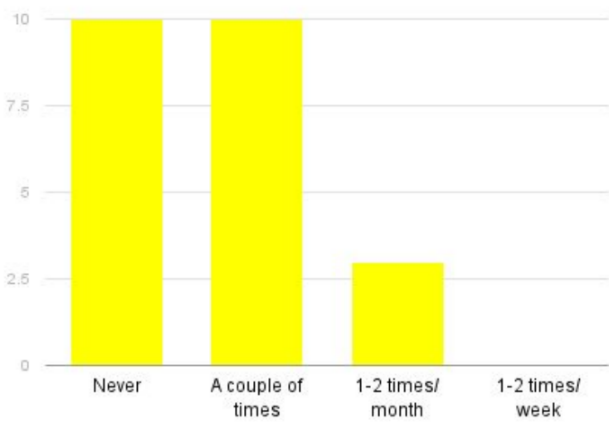


Figure 5.6: Participants usage of similar products to Le Tote before

half lived in other places across the United States.

5.1.2 Test Sessions

We invited each of the sixteen participant on a different time slot over two weeks. For 20-30 minutes, the participant walked through one of the three onboarding flows. We encouraged participants to talk out loud as they worked their way through the flow, to express opinions candidly, and to articulate what they thought various features or buttons would do.

Script Extract “Your goal is to make it through our sign-up process and I will get to shadow you doing that. You will move from screen to screen, talking out loud about what you are seeing and what you are doing, but I want you to act as you would if I was not here. I am not going to tell you where to click or what to try. I just want you to work your way through sign-up and talk me through what you are seeing and thinking.”

The questions asked by the experiment conductor during the test sessions focused on trying to understand how the participants perceived the software and its usage. After finishing the test session, we asked each participant the following set of questions:

- How does Le Tote work?
- Who is Le Tote for?
- What do you like about Le Tote?
- What would keep you from signing up with Le Tote?
- How do you generally feel about clothing rental?

We present our analysis from the onboarding flows, as well as general findings on the clothing rental model in subsection 5.1.3.

5.1.3 Analysis and Observations

In this section, we list the set of questions we wanted to analyze for each flow, along with an overview of the analysis from the participants performance using each flow.

For **the first flow**, we had a set of points that the experiment conductor should conclude from the tester interactions.

- Does the tester notice the progress bar? Does she understand it?

- Does she skip the suggestions or does she rate them all?
- Does she find customization of the tote easy?
- Is she distracted to other areas during this process?
- Does she know what she is buying?
- Where does she have trouble through the flow? What questions does she have?

The main insight from the first flow is about the items we recommend for the tester in the beginning and ask to rate. We do that in the flow so we can give the sense of personalization for the clothes she is going to rent. We used a swap interface as part of the styling process for the flow, where we featured real rental products. Participants seemed to understand and enjoy using the swipe interaction to tell us if they liked the products or not, often opting to go through the prototype flow more than once. Unfortunately, many participants ended up disliking every product that they saw. One participant said “I do not like that” eight times in a row. Though she admits to enjoying the process of disliking the clothes, the first eight interactions this tester has had with our product are all disappointing ones. We ran into the same problem during tote swap - that is, when participants saw the products, they were no longer sure the service was for them because the clothes did not look like their style. “All of these shirts look the same to me. They are for an older woman. I want something younger. Can I filter these styles according to my age,” asked a thirty-year old customer. “I do not see a lot of really special pieces here,” said another. Such comments lead us to think that customization and personalization are important and should be treated carefully.

For **the second flow** with the dialogue support, the specific questions the conductor had to answer were:

- Does the tester try to play the introductory video in the first screen?
- Does she respond with delight or confusion at the introduction of this Chloe character?
- Does she show any signs of fatigue or boredom from the lengthy process?
- Is she comfortable with sharing her age, waist size and weight?
- Does she find customization of the tote easy? Does she understand what it means?
- Is she distracted to other areas during this process?

- Where does she have trouble through the flow? What questions does she have?

For the participants who completed the second flow, we noticed repeated skepticism of Chloe's professed personalization abilities. At least one participant angrily told Chloe "Yeah, you are lying, you do not know me yet," when Chloe told her that she had enough information to style her tote. "This is a little concerning to me," said another participant about Chloe's claim. "Because I disliked everything. How can you know anything about me?" Another participant seemed confused when Chloe progressed her into tote swap after asking so many questions: "Customize my tote? Are you picking the clothes out for me, or am I picking them?". Moreover, we had a sentence that says "each piece of clothing is measured by hand" when explaining how seriously we take fit for personalization and tailoring purposes. One participant exclaimed when she saw this and said "Yeah, I don't believe that." These observations leads us to conclusion and recommendations for how to use the tailoring principle efficiently. We present our recommendations in chapter 6.

As for **the third flow**, the questions were:

- Is the tester reading all the text? Does she realize how it works?
- Does she figure out how much it costs?
- Is it clear to her the difference between adding the item to her tote in order to get it and adding it to her closet (favorites)?
- Does she find customization of the tote easy? Does she understand what it mean?
- Does she know what she is paying for?
- Where does she have trouble through the flow? What questions does she have?

This flow emphasized customization; as the flow takes the user directly to tote swap, so she can choose the items she wants. The flow utilizes the commitment and consistency concept as discussed before. All participants in this flow immediately caught the fact that they could swap items out in tote swap - perhaps because they were not primed to feel that the tote would be a perfectly customized the first time. One customer in this flow specifically mentioned customization as Le Tote's key value addition to clothing rental.

We present recommendations derived from the insights and the evaluation of the usability tests in chapter 6.

5.2 A/B Testing for Microsuasion

The design of the A/B test experiments discussed in chapter 4 allowed us to thoroughly investigate their results and impact on real users. In this section we present the setting in which the tests were conducted, and the analysis of the tests and their results.

5.2.1 Test Environment

We ran the experiments consecutively on the mobile application. Each experiment ran between 10 and 20 days. For each experiment, visitors were assigned one of the designs randomly according to a fifty:fifty percentage. Optimizely¹ platform was used to deploy tests and monitor results.

5.2.2 Analysis and Results

For each experiment, our key performance indicator (KPI) was conversion rate. For a visitor to convert, she has to pass through what is called a conversion funnel. Our conversion funnel ended with a call-to-action (CTA), which is the primary interface element that requires the user to take an action, in order to become a paid member or a successful conversion. In our tests, this was the sign-up call-to-action. We report the change in conversion rate between the control and the variant design.

Experiment A The experiment variation design tested the effect of removing exit links in the header. The experiment had 30,000 unique visitors during the test period. The control design (Figure 4.4) resulted in 1,120 (7.16%) unique conversions, while the variation design (Figure 4.4) resulted in 1,210 (7.83%) unique conversions. Using the variant design improved conversions by 9.3%. Figure 5.7 shows a summary of the experiment and results.

Experiment B Splitting checkout page experiment had 16,484 unique visitors during the test period. The control design (Figure 4.5) resulted in 723 (8.85%) unique conversions, while the variation design (Figure 4.5) resulted in 805 (9.68%) unique conversions. Using the variant design improved conversions by 9.1%. Figure 5.8 shows a summary of the experiment and results.

¹<https://www.optimizely.com/>

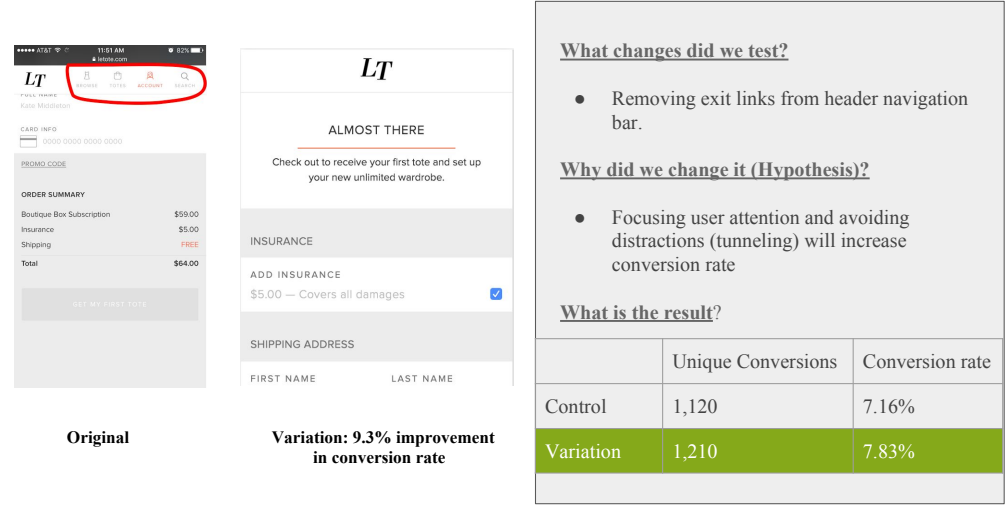


Figure 5.7: First A/B test: removing exit links

Experiment C The third experiment had 10,875 unique visitors during the test period. The control design (Figure 4.6) resulted in 212 (1.94%) unique conversions, while the variation design (Figure 4.6) resulted in 250 (2.29%) unique conversions. Using the variant design improved conversions by 18%. Figure 5.9 shows a summary of the experiment and results.

Experiment D The last experiment, which added more personalization steps to the flow, had 12,540 unique visitors. The control design (Figure 4.7) resulted in 162 (2.58%) unique conversions, while the variation design (Figure 4.7) resulted in 226 (3.6%) unique conversions. Using the variant design improved conversions by 39.5%. Figure 5.10 shows a summary of the experiment and results.

We present a discussion derived from the evaluation and results in chapter 6. Moreover, we provide a set of recommendations to integrate persuasion in user-centred design and usability studies.

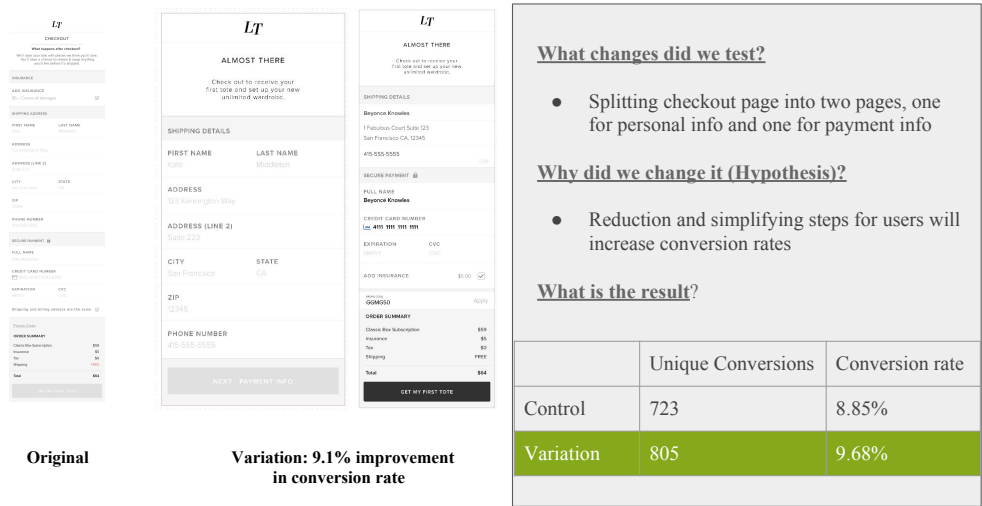


Figure 5.8: Second A/B test: splitting checkout into two pages

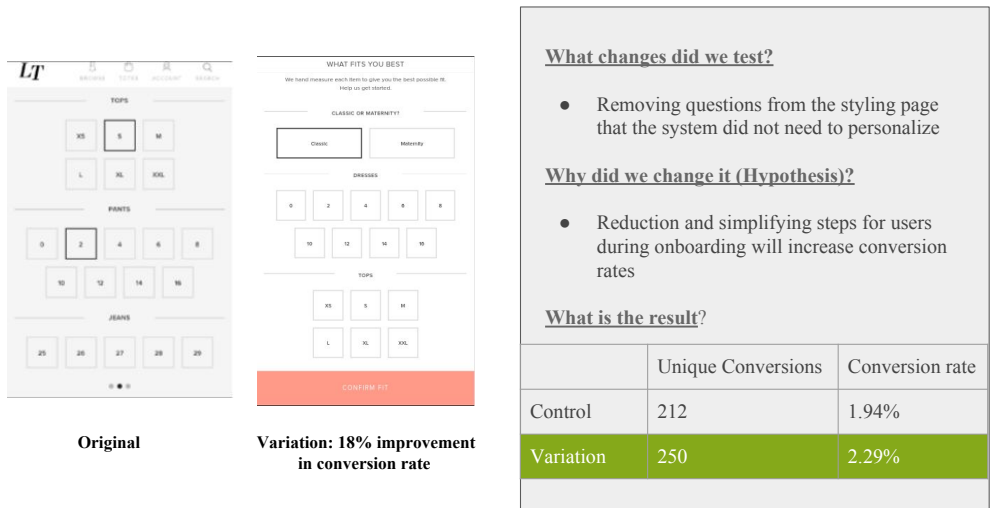


Figure 5.9: Third A/B test: simplifying styling page

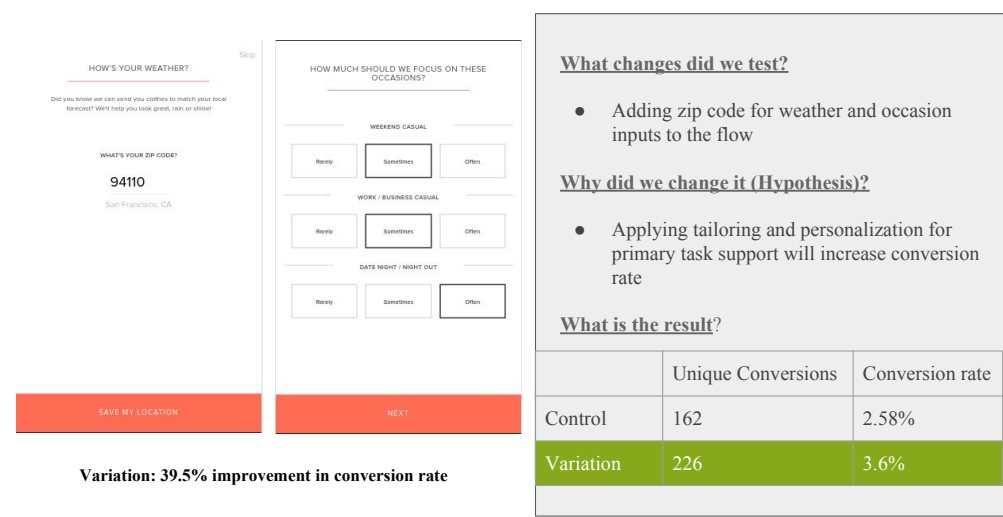


Figure 5.10: Fourth A/B test: adding tailoring through weather and occasion check

Chapter 6

Discussion

In this chapter, we discuss the results from both microsuasion and macrosuasion usability scenarios, and we outline the benefits from using user-centered methods alongside persuasion techniques during system design.

6.1 General Insights from Usability Tests

In this section, we present general insights from the three onboarding flows tested for macrosuasion.

Novelty causes confusion Six participants did not understand that the software was a rental service even after walking through the onboarding process. A particularly surprising insight we came to is that it is not clear to many participants that they are renting the clothes. Participants assumed that they could only look at the clothes, pick the ones they wanted to keep, and send the rest back. “Was it clear that you could wear the clothes? That you were essentially renting them,” we would ask at the end of the onboarding session. “No not at all,” answered one. Another confirmed how we work, grew wide-eyed and said: “I have never heard of something like that before.” This new information then usually triggered additional questions like “what if I want to buy something” and “what if I damage something?”

Lengthy process is not persuasive Participants showed fatigue when we asked them too many questions. The second flow was our longest flow, and two of the participants mentioned that the length of the onboarding was a barrier for them. Particularly when we asked questions about what items she wanted sent to her versus those that she wanted to exclude, what types of jewellery color she likes, and other granular

questions, we started hearing sighs as the next page would come up. One participant said: “If I am filling this out when I am commuting, I probably will not finish.”

Fit and sizes online are tricky Fit is something participants cared about, and did not trust the software to get right: One of the most frequent questions we got across flows was “can I pick two sizes?”, “Sometimes I am an extra small and sometimes I am a small,” explained one customer. All but two of the participants organically expressed that they worry about fit whenever they shop online. Most of them assumed the software would get fit wrong “the first time.” Participants seemed to think the onus was on them to know what size they are and to hack a solution rather than to sit back and to trust the software to get it right.

Need to know more Every participant had additional questions about how the service worked, and many of these questions overlapped. The most common misconception about the service was whether we rented clothes or not, but there was a number of other points of confusion about the service. By the end of the sessions, we could recite the litany of common questions. The top five were:

- What if I want to buy something?
- Can I keep some of the items and send others back?
- What does unlimited mean?
- Will I get in trouble if I damage the items?

The main observation from running usability tests was that some persuasive techniques applied to the original designs were received better by users than the rest of the techniques. Since the test was for a personalized and tailored software, a virtual persona having a conversation would have been thought of as the best approach of creating a communication and trust channel with the user. Our tests showed that, for this specific type of service, it was not necessarily the best approach. Users were skeptical about letting a virtual persona, which has no prior knowledge about them, suggest items to them, and style their clothing items. Moreover, because the concept of using a software for clothing rental was new, the users appreciated a hands-on experience more; to get familiar with the approach. We derive conclusions based on these observations in chapter 7.

6.2 General Insights from A/B Tests

In this research, we conducted four different A/B tests, each applying a set of persuasive design principles. We observed the results after deploying the design changes. In this section, we discuss our insights from the observations.

Primary task support has a positive impact on the persuasion of users on the micro-level. Guiding the users through the process of signing up, and tunneling the steps required, can have a high impact on the conversion rate. Reducing the steps required to perform a task shortens the time required to finish it, and simplifies the process for the users. As we observed from the test, increasing the ability of the users to be persuaded through reducing time and mental effort, can lead to a positive improve in conversion. Giving full control to the users to modify their products as in the last test, while applying the reduction principle, gave the users a boosted sense of control over their experience. On giving users control, it is crucial to make the outcome align with the users' expectations and interests. For instance, after the user rates the items shown to her on the onboarding process, the five items suggested to her should follow the same pattern and trend. Showing an item that a user disliked, or an item having the same style, would have a negative impact on conversion, hence persuasion. When users are taken directly to the page where they get to choose the five items, and they go forward and choose them, they feel committed to their decision. The users feel they have made a free choice. If they feel coerced or obliged, they can explain their choice by saying they were 'forced' into the decision. When they believe they have made a free choice, they feel personally responsible for their decision and seek to justify it. On moving to the sign up page, users feel the need to stay consistence with their free choice through signing up.

Our tests proved that even a small change towards any of the persuasion concepts can lead to a noticeable positive impact on conversion rate. Combining concepts from different persuasive system design models can help in boosting the conversion rates and persuasion more efficiently.

6.3 Relation with Previous Work

Results from both tests, usability tests, and A/B tests, emphasize the role of using persuasive concepts in system design, and its positive impact on the persuasiveness of the system. Adapting concepts from the Persuasive System Design Model (Oinas-Kukkonen and Harjumaa, 2009), along with concepts from Fogg's persuasion model (Fogg et al., 2002), and general psychological persuasive concepts (Cialdini and Garde, 1987), can have a noticeable impact

on the conversion and satisfaction rate. However, using persuasive concepts without filtering, or without electing suitable ones for the technology, can lead to negative consequences. This increases the importance of using user-centered design approaches in designing persuasive systems, as our study suggests. This suggestion goes in line with previous work in combining user-centered design and persuasion design to enhance persuasiveness (Jong et al., 2014, Beerlage-de Jong et al., n.d.).

Chapter 7

Conclusions

In this research, we applied persuasive system design concepts from multiple researches, along with psychological concepts of persuasion, in designing and building a software system. The application of the persuasive concepts was implemented through a user-centered approach, where users got involved either during the design process, or during the evaluation stage. On the first set of tests, users were invited to conduct user tests on a redesign of an experience. On the second set of tests, A/B tests of persuasive redesigns were performed directly on the software product. The questions we tried to answer in this research are:

- Are all concepts from different persuasive design models suitable for different types of software?
- What is the value added by using user-centered methodology for designing persuasive systems in evaluating persuasive concepts?
- What insights and observations can we get from usability testing of persuasive elements during software design?
- Can we test microsuasion and macrosuasion design changes simultaneously? And what are the benefits of it?

To the extent of our knowledge, our research is the first to combine persuasive system design with user-centered approaches on both the micro- and macro-levels of persuasion. Designing and evaluating experiences for both levels simultaneously allows software designers to focus on the persuasiveness of the whole technology, while testing and evaluating micro-interactions and small design or language changes on existing designs for augmenting the persuasiveness of the whole experience. This speeds up the iterative process of persuasive system design, and allows to test the concepts on a wider range of existing and potential users of the system. We conclude that combining

persuasive design with user-centered design allows us to test and validate persuasion concepts, in line with previous research in the same area. Moreover, we found that using user testing and A/B tests provided us with more insights on the suitability of different persuasion concepts for the experience we provide. This helped in redesigning the interface of the technology, by excluding or adding new concepts of persuasion, and retesting the design. This observation can be seen in the case of the human persona suggesting items for the user. Dialogue support is a main principle in the persuasive system design model. However, in this specific context and type of technology, the users did not feel totally comfortable with it, and it acted against persuasion.

Results of our research from evaluating the usage of user-centered design in persuasion can be presented as primary concepts for designing any persuasive technology. Involving the users at an early stage in testing and evaluating persuasive techniques can help in rejecting persuasive concepts that do not apply for the specific type of software in test. This helps in offering opportunities to deal with the user needs resulting from the user-centered approach, hence augmenting the persuasiveness of the software. Moreover, simultaneously working on evaluating persuasiveness on both micro- and macro-levels, can lead to crucial findings on the experience level, in both the micro-interactions and the language used in the software. Through iterating over the design, and in alignment with persuasive concepts, the persuasive level desired can be achieved.

As the software product being investigated in this research was an already established service provided by a company, we had some limitations regarding expanding the tests, especially in the A/B tests. We believe that applying our recommendations and findings in a research environment would result in a more concrete definition of a model for combining persuasive design and user-centered design on the macro- and micro-level of persuasion.

As results from this study introduce a conceptual model of electing suitable persuasive concepts for different technologies, future work can build on top of these results. Further work can investigate different types of software, evaluate the usage of persuasive concepts on them, and then provide recommendations of specific persuasive concepts suitable for each technology type maximizing persuasiveness. Moreover, different approaches of user-centered design and evaluation can be tested, and extended results can be provided.

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Appendix A

Recruiting Testers Questionnaire

The questionnaire consisted of eight questions, and was distributed online.

1. What gender do you identify yourself as?
 - Male
 - Female
 - Other
2. Which of the following best describes your age?
 - 18-25
 - 26-30
 - 31-35
 - 36-40
 - 40-45
 - 46+
3. Have you participated in a focus group or any user research in the past six months?
 - Yes
 - No
4. Do you or does anyone in your home work in technology (engineering, product, or design) or e-commerce?
 - No
 - Yes, I work in technology
 - Yes, I work in e-commerce

- Yes, someone in my family works in technology
 - Yes, someone in my family works in e-commerce
5. Which of the following best describes your personal annual income?
- Under \$25,000
 - \$26,000-\$50,000
 - \$51,000-\$75,000
 - \$75,000-\$125,000
 - Over \$125,000
 - Prefer not to say
6. Besides checking email, what are typical activities do you do on the computer?
- Social networking
 - Watching TV/Movies
 - Gaming
 - Reading the news
 - Shopping for clothes
 - Shopping for electronics or other goods
 - Banking
 - Programming
7. In the last year, how often have you visited Le Tote website?
- Never
 - A couple of times
 - 1-2 times/month
 - 1-2 times/week
 - Daily
8. In the last year, how often have you visited similar services to Le Tote website?
- Never
 - A couple of times
 - 1-2 times/month
 - 1-2 times/week
 - Daily